UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

19

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/636,161	08/10/2000	SHUMIN WANG	98124X205487	6517

29050 7590 06/18/2002

PHYLLIS T. TURNER-BRIM, ESQ., LAW DEPARTMENT
CABOT MICROELECTRONICS CORPORATION
870 NORTH COMMONS DRIVE
AURORA, IL 60504

EXAMINER	
UMEZ ERONINI, LYNETTE T	
ART UNIT	PAPER NUMBER
1765	12

DATE MAILED: 06/18/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

MFE 12

Office Action Summary	Application No. 09/636,161	Applicant(s) WANG ET AL.	
	Examiner Lynette T. Umez-Eronini	Art Unit 1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1,3-27 and 33-35 is/are pending in the application.

4a) Of the above claim(s) 28-31 is/are withdrawn from consideration.

5)☒ Claim(s) 32 is/are allowed.

6)☒ Claim(s) 1,3-6,8,10-13,15-18,20-27 and 33-35 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ Claim(s) 36-39 are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 8 and 9 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of claims 1 and 3-31 in Paper No. 11 is acknowledged.

2. Newly submitted claims 36-39 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: Unlike the original claims 1-27, which are directed to a polishing system, newly submitted claims 36-39 are directed to a polishing method.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 36-39 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 3-6, 8, 10-13, 15-18, 20-27, 33, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sasaki et al (US 5.770, 095).

Sasaki teaches a polishing (system for polishing) agent (column 1, lines 6-10) comprising: (i) water (column 4, line 53); (ii) an oxidizing agent such as H_2O_2 (column 4, line 3-5 and 53); (iii) phosphonic acid (column 3, line 49), which is the same as at least one polishing additive; and (iv) an abrasive (column 8, lines 5-10 and column 10, lines 10-16 and 43-46).

Sasaki differs in failing to teach one polishing additive that increases the rate at which the system polishes at least one layer of the substrate, **in claim 1**.

Since Sasaki teaches a phosphonic acid (column 3, line 49) that forms a protection film by reacting with metals, suppresses isotropic chemical polishing (column 3, lines 37, 38, 48, 49, and 18-24) and that is the same as applicant's polishing additive, then using Sasaki's polishing additive in a polishing a semiconductor layer would result in one polishing additive that increases the rate at which the system polishes at least one layer of the substrate.

It would have been obvious to one having ordinary skill in the art at the time of the claimed invention to use a polishing additive such as a phosphonic acid as taught by Sasaki for the purpose of suppressing isotropic polishing of the metal surface.

5. Claims 7, 9, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sasaki ('095) as applied to claim 1 above, and further in view of Kaufman et al. (US 5,783,489).

Sasaki differs in failing to teach one polishing additive that is selected from the group consisting of:

di-, tri-, and poly-phosphonic acid, phosphonoacetic acids, and mixtures thereof, **in claim 7;**

ethylene di-phosphonic, 1-hydroxyethylidene-1,1-diphosphonic acid, and a mixture thereof, **in claim 9**; and

2-aminoethyl phosphonic acid, amino(trimethylenephosphonic acid), diethylenetriaminepenta(methylenephosphonicacid), hexamethylenediaminetetra(methylene phosphonic acid), and mixtures thereof, **in claim 19**.

Kaufman teaches a variety of optional additives such as stabilizers that are used to promote stabilization of the polishing slurry including oxidizing agents against settling, flocculation and decomposition and examples of a preferred a polishing slurry includes and are not limited to phosphonic acids such as aminotri(methylenephosphonic), 1-hydroxyethylidene-4-diphosphonic, hexamethylenediaminetetramethylene phosphonic, and diethylenetetramine pentamethylene phosphonic acid (column 6, lines 40-55).

It would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Sasaki by using the phosphonic acid compounds as taught by Kaufman for the purpose of promoting stabilization of polishing slurry against settling, flocculating, and decomposing.

3. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sasaki ('095) in view of Kaufman (US '489) as applied to claim 1 above, and further in view of Romberger et al. (US 5,230,833).

Sasaki in view of Kaufman differs in failing to teach aminoethylethanolamine, polyethyleneimine, and a mixture thereof, **in claim 14.**

Romberger teaches a polishing slurry comprising a polishing rate accelerator to increase polishing rate (column 7, lines 57-61) and the polishing rate accelerator may be aminoethylethanolamine (column 9, lines 23-50).

It would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Sasaki in view of Kaufman by using the aminoethylethanolamine compound as taught by Romberger for the purpose of increasing the polishing rate of the slurry.

4. Claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sasaki ('095) in view of Kaufman ('489) and Romberger ('883) as applied to claim 1 above, and further in view of Prigge et al. (US 4,968,381).

The combination of Sasaki, Kaufman, and Romberger differs in failing to teach the system comprises at least one polymeric compound that reduces the polishing rate of at least one layer associated with the substrate.

Prigge teaches using a conventional polishing agent in addition to a small quantity of polyvinyl alcohol to produce substantially haze-free semiconductor surfaces as described in British patent specification No. 1,418,088, (DT-OS 2,247,067), (column 1, lines 31-36). Polyvinyl alcohol is an example of a polymeric compound that is described in applicant's Specification (page 11, lines 34ff). Since Prigge's polyvinyl alcohol is used in polishing a semiconductor surface and is the same as applicant's

polymeric compound, then using the polyvinyl alcohol in a polishing agent would result in a polymeric compound that reduces the polishing rate of at least one layer associated with the substrate.

Hence it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify the combination of Sasaki, Kaufman, and Romberger by using a polymeric compound such as polyvinyl alcohol that is taught by Prigge for the purpose of obtaining a haze-free semiconductor surface.

Allowable Subject Matter

5. Claim 33 is allowed. Prior art fails to teach a polishing additive comprising iminodiacetic acid.

Response to Arguments

6. Applicant's arguments filed February 28, 2000 have been fully considered but they are not persuasive. Applicant traverses the obviousness rejection over Sasaki in view of Kaufman and Romberger for failing to disclose a polishing additive that increases the rate at which the system polishes at least one layer of a multi-layer and to teach the use of an amine additive as rate accelerators for any type of substrate, in particular a multi-layer substrate that includes a first metal layer and a second layer as recited in the claims.

Applicant's arguments are unpersuasive because Kaufman and Romberger respectively teach a phosphonic acid (column 3, line 49), which is the same as at least

one polishing additive and aminoethylethanolamine as a polishing rate accelerator (column 9, lines 23-50). Since Kaufman's and Romberger's additives are the same compounds as those described in applicant's Specification, then using Kaufman's and Romberger's additives in a polishing agent would respectively result in a chemical agent for increasing the rate at which the system polishes at least one layer of a multi-layer and an amine additive as rate accelerators for a multi-layer substrate that includes a first metal layer and a second layer.

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynette T. Umez-Eronini whose telephone number is 703-306-9074. The examiner can normally be reached on Second Friday.

ltue
June 12, 2002

ROBERT KUNEMUND
PRIMARY EXAMINER